

Abstract

Metal-insulator-metal planar electron emitters (PEEs) have potential for use in advanced lithography for future generations of semiconductor devices.

- 5 The PEE has, however, a limited lifetime, which restricts its commercial applicability. It is believed that the limited lifetime of the PEE is limited by in-diffusion of metal ions from the anode. The in-diffusion may be countered in a number of different ways. One way is to cool the PEE to temperatures below room temperature. This lowers the metal ion mobility, and so the metal ions are
- 10 less likely to diffuse into the insulator layer. Another way is to occasionally reverse the electrical potential across the PEE from the polarity used to generate the electron beam. This counteracts the electrical driving force that drives the positively charged metal ions from the PEE anode to the PEE cathode.

15